XMM-Newton Observation of the cluster of galaxies A1674

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Introduction

A1674 is a richness class 3 cluster with large galaxy number count (N_0) of 165 as z of 0.1058. Regardless of its richness, X-ray luminosity was observed as low as 5×10^{43} erg/s in the ROSAT all sky survey. We observed this cluster with ASCA and found extended X-ray emission elongated along NE-SW direction. The gas temperature derived from the ASCA spectra is 3.2(+-0.6) keV. The metal abundance is determined to be 0.0 with 90% upper limit of 0.2. We speculated that the evolution of hot gas is delayed in this cluster that other clusters in nearby universe.

XMM-Newton Observation of A1674

A1674 was observed with XMM-Newton on Apr 17th in 2002. Total exposure of 28ks was made with thin-filter, full-window mode. However, the last half of the observation was suffered from flare-event, reducing the available exposure of 17ks for EPIC-MOS, and 14ks for EPIC-PN. SAS ver5.41 was used in the data reduction.
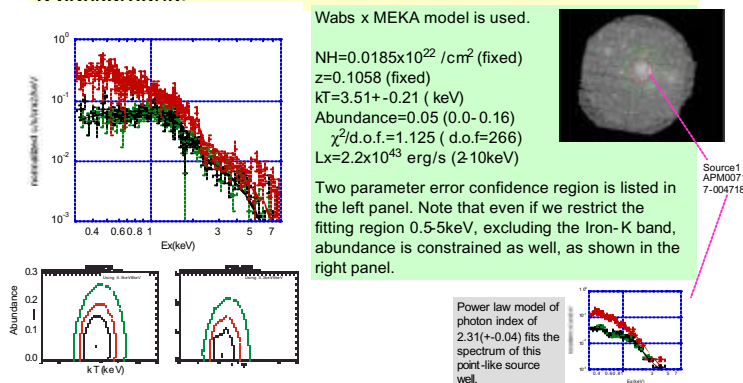
XMM-Newton X-ray Image of A1674

Left) 0.3-5keV image, exposure corrected, EPIC-MOS1, MOS2, PN summed. In addition to exttended emission point-like sources are observed, which were not obvious in ASCA image.

Right) 12'x12' region around the center. X-ray contour overlaid on DSS2 red image. Note that 1' correspond to about 0.2Mpc.
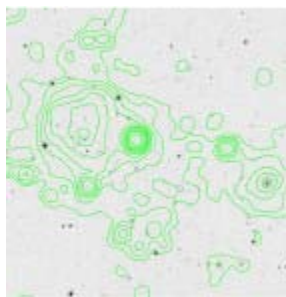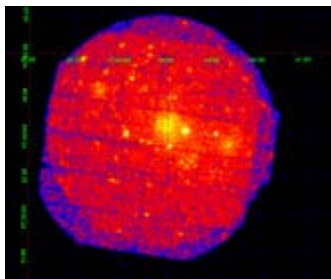

XMM-Newton X-ray Spectra of A1674

X-ray spectrum of the central part (radius<3'; indicated as red-circle) of A1674 diffuse emission is investigated. Point-like sources indicated as pink-circles are excluded. We have tried various background data including the University Birmingham group data, but still have some problem. We thus take the annulus region of the same observation indicated as green as a background.

Wabs x MEKA model is used.

NH=0.0185×10^{22} /cm^2 (fixed)
z=0.1058 (fixed)
kT=3.51+-0.21 (keV)
Abundance=0.05 (0.0- 0.16)
χ^2/d.o.f.=1.125 (d.o.f=266)
Lx=2.2×10^{43} erg/s (2-10keV)

Two parameter error confidence region is listed in the left panel. Note that even if we restrict the fitting region 0.5-5keV, excluding the Iron- K band, abundance is constrained as well, as shown in the right panel.

Source1 APM0071 7-004718

Power law model of photon index of 2.31(+/-0.04) fits the spectrum of this point -like source well.

Comparison with other clusters

The source of metal in cluster hot gas should be galaxies. Large galaxy count and small metal abundance in A1674 might be contradictory. We suspect, for example, significant amount of the metal ejected from galaxies were lost in space before the hot gas (and/or gravitational potential) is accumulated in this cluster.

Comparison with other clusters. Data except for A1674 are taken from Matsumoto et al., 2000.
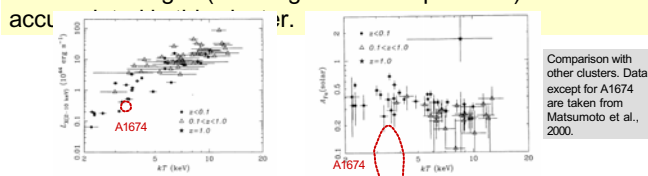
Reference

Hashimotodai, K., Takai, T., Hayashida, K., Kawasaki, W., 2000, Adv. Space Science, 25, p.611 and references therein.

Matsumoto et al., 2000, PASJ 52, p.153